REMARKS

After entry of this Amendment, claims 1-12, 14-28, and 30-48 are pending in the application. Claims 41-48 have been added in this Amendment. Claim 1, 15, 17, 31, 33, 34, and 40 have been amended to more particularly point out and distinctly claim the subject matter which applicants regard as the invention. Reconsideration of the application as amended is requested.

In the Office Action dated March 25, 2005, the Examiner indicated that claims 15, 31, and 40 were allowable over the prior art of record, if the rejection under 35 U.S.C. §112, 2nd paragraph was overcome, since the phrase "all internal metering" was unclear. It is submitted that claims 15, and 31 have been clarified by inserting that the sensor includes at least one fluid flow metering device, and that the switch electronically bypasses all internal fluid flow metering devices for reverse cycle operation. Claim 40 has been rewritten in independent form including all of the limitations of the base claim and any intervening claims, and has been amended to clarify that the monitoring means includes at least one internal fluid flow metering device, and that the switch bypasses all internal fluid flow metering devices for reverse cycle operation. It is submitted that these amendments traverse and overcome the Examiner's rejection under 35 U.S.C. §112, 2nd paragraph; notice of which is requested.

Claims 1, 12, 14, 17, 28, 30, and 33-39 stand rejected under 35 U.S.C.§103(a) as being unpatentable over McKendrick (U.S. Pat. No. 4,644,848) in view of Tambini et al (U.S. Pat. No. 5,592,396). The Examiner asserts that it would have been obvious to one skilled in the art to provide the apparatus of McKendrick with a sensor for measuring differential pressure in order to indicate when the condition of an impact tool changes (column 6, line 3). It is submitted that the cited references, taken singularly or in any permissible combination, do not anticipate, teach or suggest the invention as recited in the claims of the present invention. In particular, the claims have been amended to recite, in part, that the central processing unit validates a fastener tightening cycle process based solely on a monitored signature of fluid flow versus time and/or without reference to an actual amount of torque applied to the fastener as more specifically recited in the pending claims. In contrast, the McKendrick reference discloses adjusting the pressure of fluid applied to a fluid powered tool, which is completely different from monitoring the flow of fluid to the tool to be controlled where the fluid is supplied at a regulated constant fluid pressure. The McKendrick reference taken singularly or in any permissible

combination; fails to anticipate, teach or suggest the invention as recited in the pending claims. The addition of the Tambini et al reference fails to overcome the deficiencies of the McKendrick reference. As set forth in the attached Declaration under 37 C.F.R. §1.132 of Mark W. Lehnert, the Tambini et al reference (hereinafter '396) discloses the use of airflow to map the fastening event using an apparatus similar to the present invention. However, the device of the '396 reference does not use the flow signature for control but rather as a trigger signal to start counting either the onset of a snug point or the proper starting point based on attaining a sufficient amplitude of pulses from an impact type power tool. In addition, in an impact wrench, the pulsed nature of the flow signal during the tightening of hammering, allows the blows, impacts to be easily counted for monitoring or control purposes. Further, the '396 patent discloses, determining whether the minimum and maximum rates of change of the fluid flow rate during tightening are within predetermined values and then, statistically processing the parameter computed during subsequent tightenings to identify trends or deviations from the normal conditions, and notifying an operator of such trends or deviations. The process for setting up the '396 system requires significant operator input and decision-making or, in the alternative, a considerable amount of data collection is required for the computer to properly develop the limits through calculations. A series of "normal" tightenings, preferably at least 25, may be performed and the results recorded manually or transferred automatically to the computer 56 (or computer 52). By statistically evaluating these results in computer 56 (or computer 52), useful limits may then be set in computer 52. These limits may then be used for trapping (identifying) trends or deviations from learned normal conditions. This is a significant deviation both in process and in intent from the present invention. The present invention uses only one normal tightening cycle (LEARN Curve) to become fully set-up and functional. While the '396 patent describes the use of the device with direct drive (geared continuously driven) tools, the disclosure for controlling a pulse/impact type tool is for a control method that counts the number of pulses (once the amplitude level exceeds a predetermined level) to start counting and controlling the number the pulses and then calculating the area under each pulse to determine the total energy of the controlled number of pulses via a mathematically derived equivalent torque value. Means is provided for electrically processing the signal to count the number of blows delivered by the wrench. Means is provided to shut-off the fluid supply to the tool when a predetermined number of blows have been delivered, and means is provided for

displaying the number of blows counted. Attempts at qualifying the event is claimed to be accomplished by mathematically comparing the summation of the total area represented by the pulses to preprogrammed high and low torque limits to determine acceptance based on the torque limits. Additionally, disclosure in the '396 patent is made that provides for trending and alarming the operator of trending based on the last two displayed fastening cycles. Extensive use of the flow signal gradient is disclosed in the '396 patent to determine such information as joint rate, joint configuration, lubrication and other varying conditions on which the system will report in an attempt to provide an indication of error detection. In the preferred embodiment of the '396 patent a number of parameters are derived to help select the appropriate portion of the flow time curve over which to measure the flow gradient during the active phase of the tightening process. These levels are expressed as a percentage of the previously described mean speed level. The mean gradient is measured between the two points. This is a significant departure from the use of the flow/time relationship as employed in the present invention. The present invention is based on reaching equilibrium in the threaded fastener/joint/tool system at the desired torque level. The present invention is one of a prescribed process whereby the operator uses a closed loop control method including a rotary torque transducer to automatically teach (LEARN TgTq) the system the proper pressure setting for the individual tool being used through a gradual and controlled ramping of the air pressure while monitoring the applied torque to reach a condition of equilibrium in the tool/joint at the desired torque level. An actual run-down is then performed on the application (LEARN Curve) using the rotary torque transducer to determine the requisite run time required to attain equilibrium in the joint/tool system. This step is performed at the controlled pressure level as determined in the previous step and is controlled/determined by monitoring the signal from the transducer and stopping the airflow via a closed loop system. The actual control during the normal run cycle is by monitoring the flow drop off until it levels off (knee-over) and then timing the delivery of the controlled air pressure as predetermined in the Learn Curve step of the set-up routine to attain a condition of equilibrium in the system. The present invention does not count the blows or pulses for control nor does the present invention attempt to calculate and display the torque from the data collected during these pulses. The present invention does not provide any information regarding torque applied by the tool and in fact the "impacts" are filtered out of the signal in the present invention. The present invention is directed to process control, rather

than torque control as disclosed in the '396 patent reference. The '396 patent reference attempts to correlate counting impacts and calculating area (energy) under the curve to the amount of torque applied to the fastener. Ultimately, this correlation proved impossible to accomplish in a commercial product, and no devices were ever commercially sold based on the '396 patent. The McKendrick and Tambini et al references, taken singularly or in any permissible combination with each other, fail to anticipate, teach or suggest validating a fastener tightening cycle process based solely on a monitored fluid flow signature versus time and/or without reference to an actual amount of torque applied to the fastener as more specifically recited in the pending claims. Reconsideration of the Examiner's rejection is requested.

Claims 2, 4, 6, 7, 9, 18, 20, and 22-25 stand rejected under 35 U.S. C. §103(a) as being unpatentable over McKendrick (U.S. Pat. No. 4,644,848) in view of Tambini et al (U.S. Pat. No. 5,592,396) and further in view of Lysaught (U.S. Pat. No. 6,055,484). The Examiner asserts that it would have been obvious to one skilled in the art to provide the apparatus of McKendrick with setup process for each fastener tightening cycle to be learned. (Column2, lines 34-37). It is submitted that the addition of the Lysaught reference to the combination of McKendrick in view of Tambini et al does not overcome the deficiencies of the McKendrick and Tambini et al references for the reasons stated in detail above as if restated here in their entirety. The Lysaght reference discloses a device that monitors either the pressure of an air tool, the current of an electric tool, or the torque of a mechanical wrench to determine if the tool shut off at a target torque. The Lysaght reference taken singularly or in any permissible combination with McKendrick and/or Tambini et al,, fails to anticipate, teach or suggest validating a fastener tightening cycle process based solely on a monitored fluid flow signature versus time as more specifically recited in the pending claims. Reconsideration of the Examiner's rejection is requested.

Claims 3, 5, 16, 19, 21, and 32 stand rejected under 35 U.S.C. §103(a) as being unpatentable over over McKendrick (U.S. Pat. No. 4,644,848) in view of Tambini et al (U.S. Pat. No. 5,592,396) and Lysaught (U.S. Pat. No. 6,055,484), and further in view of Whitehouse (U.S. Pat. No. 5,315,501). The Examiner asserts that it would have been obvious to someone skilled in the art at the time of the invention to provide the apparatus of McKendrick with a transducer connectible between the tool and the fastener as taught by Whitehouse in order to provide the same benefit as discussed in Whitehouse. It is submitted that the addition of the Whitehouse reference to the combination of McKendrick in view of Tambini et al and Lysaught

does not overcome the deficiencies of the McKendrick, Tambini et al, and Lysaught references for the reasons stated in detail above as if restated here in their entirety. The Whitehouse reference discloses a torque overshoot compensator, where the torque overshoot is determined and the torque set point is adjusted to compensate for the torque overshoot. During subsequent fastening jobs, the deceleration time is measured between the same selected fractional values of target torque, the overshoot is calculated from the expression Y=K/X, where Y is overshoot, X is the deceleration time required to tighten the fastener, and K is a constant determined using the measured deceleration time and torque overshoot during a previous high torque rate job in the foregoing expression. The measurements and calculations are performed job-to-job developing a running average of the constant K. Therefore, the torque transducer 32 is required for each fastener tightening cycle, not just for setup purposes as claimed in the pending claims of the present application. The Whitehouse reference taken singularly or in any permissible combination with McKendrick and/or Tambini et al. and/or Lysaught, fails to anticipate, teach or suggest validating a fastener tightening cycle process based solely on a monitored fluid flow signature versus time and/or without reference to an actual amount of torque applied to the fastener as more specifically recited in the pending claims. Reconsideration of the Examiner's rejection is requested.

Claims 10, 11, 26, and 27 stand rejected under 35 U.S. C. §103(a) as being unpatentable over McKendrick (U.S. Pat. No. 4,644,848) in view of Tambini et al (U.S. Pat. No. 5,592,396) and further in view of Bickford et al (U.S. Pat. No. 4,864,903). The Examiner asserts that it would have been obvious to one skilled in the art to provide the modified program of McKendrick with an error proofing program for each fastener tightening cycle in order to obtain the significant advantages of faster operation of the wrench, eliminate or reduce operator error, more reliable and accurate operation of the wrench to impose the desired torque on the fastening element, and ability to obtain a documented history of the tightening of the fastener. (Column 3, lines 32-37). It is submitted that the addition of the Bickford reference to the combination of McKendrick in view of Tambini et al does not overcome the deficiencies of the McKendrick and Tambini et al references for the reasons stated in detail above as if restated here in their entirety. The Bickford et al reference discloses converting the operating pressure of the wrench, after compensation for the temperature of the pressure transducer, to a torque measurement. The Bickford et al. reference taken singularly or in any permissible

combination with McKendrick and/or Tambini et al,, fails to anticipate, teach or suggest validating a fastener tightening cycle process based solely on a monitored fluid flow signature versus time and/or without reference to an actual amount of torque applied to the fastener as more specifically recited in the pending claims. Reconsideration of the Examiner's rejection is requested.

New claims 41-48 are submitted for the Examiner's consideration, which is requested.

It is respectfully submitted that this Amendment traverses and overcomes all of the Examiner's objections and rejections to the application as originally filed. It is further submitted that this Amendment has antecedent basis in the application as originally filed, including the specification, claims and drawings, and that this Amendment does not add any new subject matter to the application. Reconsideration of the application as amended is requested. It is respectfully submitted that this Amendment places the application in suitable condition for allowance; notice of which is requested.

If the Examiner feels that prosecution of the present application can be expedited by way of an Examiner's amendment, the Examiner is invited to contact the Applicant's attorney at the telephone number listed below.

Respectfully submitted,

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Dated: August 25, 2005
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